The present disclosure provides, among other things, articles useful as an underlayment material that makes floor tile installation easier and faster.
UNDERLAYMENT ARTICLES, COMPOSITIONS, AND METHOD OF MANUFACTURE THEREOF

BACKGROUND

[0001] In the flooring industry, underlayment is a layer of material used between a subfloor and designed floor covering. Underlayment provides a layer cushion and absorbs variations and/or imperfections present in the subfloor from impacting either the aesthetic or the stability of the designed floor covering. Typically, a layer of underlayment is either attached to the subfloor using adhesives, staples, small nails or simply rests on top of the subfloor.

SUMMARY

[0002] The present disclosure provides an insight that some compositions are particularly useful as articles in the manufacture and/or installation of flooring with surprising and beneficial attributes.

[0003] Implementations of articles of the present disclosure are useful for a wide range of surface covering applications. The present disclosure also provides methods of preparing and/or installing such coverings.

[0004] The present disclosure provides articles. In particular, articles for use as an underlayment for surface coverings, e.g., flooring.

[0005] In some embodiments, articles when employed with installation of a designed floor covering, such as resilient tiles, provide a smooth surface minimizing telegraphing of subfloor topography. In some embodiments, articles when employed with installation of flooring, such as resilient tiles, provide a smooth surface minimizing and/or eliminating any telegraphing of seam joints, so that seam tape used to join sections of underlayment is flat or substantially planar with joined sections of underlayment.

[0006] In some embodiments, articles when employed with installation of flooring, such as resilient tiles, provide a moisture barrier.

[0007] In some embodiments, articles when employed with installation of flooring, such as resilient tiles, provide a layer of sound abatement.

[0008] In some embodiments, articles when employed with installation of flooring, such as resilient tiles, provide ease of installation. In some embodiments, ease of installation includes minimal and/or no adhesive drying time. In some embodiments, ease of installation includes minimal and/or no subfloor preparation time. In some embodiments, ease of installation includes an ability to reposition underlayment, flooring, and/or underlayment and flooring relative to one another.

[0009] In some embodiments, an article is underlayment or an underlayment system for flooring.

[0010] In some embodiments, an article of underlayment is a composition that includes a cellulosic layer.

[0011] In some embodiments, a cellulosic layer is cellulose containing material or cellulose-like material. In some embodiments, a cellulosic layer is paper-like. In some embodiments, a cellulosic layer is cork, felt, or combinations thereof. In some embodiments, a cellulosic layer is felt.

[0012] In some embodiments, a cellulosic layer can be any dimension desired.

[0013] In some embodiments, a cellulosic layer has a thickness of about 23 mil.
In some embodiments, when additional article of underlayment including a cellulosic layer having double sided tape applied thereto is positioned and applied, it is positioned and applied adjacent so that there is uniform underlayment coverage to a subfloor. In some embodiments, multiple sections of underlayment are needed to substantially uniformly cover a subfloor.

In some embodiments, a length of an entire edge of each cellulosic layer of adjacent sections of underlayment are aligned such that an exposed edge of each pullback of each section underlayment touch.

In some embodiments, a layer of seam tape is positioned to traverse two adjacent sections of underlayment. In some embodiments, a layer of seam tape is positioned and aligned to traverse two adjacent sections of underlayment by application to cover a pullback of section of underlayment where the exposed edges of a cellulosic layer touch.

In some embodiments, when a section of underlayment that includes a cellulosic layer with double sided tape applied thereto is positioned atop a subfloor and is adjacent to another section of underlayment that includes a cellulosic layer with double sided tape applied thereto and is also positioned atop a subfloor, a length of a pullback along an entire edge of each cellulosic layer for both areas of underlayment that are adjacent and aligned are joined using a layer of seam tape.

In some embodiments, a layer of seam tape is substantially the same thickness as double sided tape.

In some embodiments, a width of a pullback, that is a distance from an edge of an exposed area of a cellulosic layer to a start of an applied area of double sided tape, is greater than one half of a width of a layer of seam tape. In some embodiments, a width of a pullback is determined based on a width of a layer of seam tape. In some embodiments, a width of a layer of seam tape is any standard width. In some embodiments, a width of a pullback is about 1.125 inches. In some embodiments, a width of a layer of seam tape is about 1.89 inches.

In some embodiments, when a layer of seam tape joins adjacent layers of underlayment, a smooth surface that minimizes and/or eliminates any telegraphing of seam joints is formed. In some embodiments, seam tape used to join sections of underlayment is flat and/or substantially planar with joined sections of underlayment. That is, in some embodiments, when seam tape is applied along a pullback of an edge of two adjacent cellulosic layers, seam tape connects the layers, so that the layers are substantially planar.

In some embodiments, an article of underlayment is a composition that includes a release liner.

In some embodiments, a release liner covers a designed floor coverings side adhesive of a layer of double sided tape. In some embodiments, a release liner includes a release coating removably applied to a designed floor covering side adhesive layer.

In some embodiments, an article of underlayment is characterized in that it is capable of being rolled so that it is easy to store and apply.

In some embodiments, an article of underlayment is a composition that includes a cellulosic layer having a coating applied thereto.

In some embodiments, a cellulosic layer is coated on at least one side. In some embodiments, a coating on a cellulosic layer is characterized in that it provides adhesion. In some embodiments, a coating on a cellulosic layer is characterized in that it imparts waterproofing.

In some embodiments, an article of underlayment is a composition that includes a layer of material for sound abatement.

In some embodiments, a sound abatement layer is positioned between a subfloor and a cellulosic layer.

In some embodiments, a sound abatement layer is foam, concrete, masonry, wood, plastics, insulating wool, or composite materials.

In some embodiments, sound abatement for an article of underlayment is characterized by an impact insulation class (or IIC) rating. In some embodiments, an IIC provides a rating of how well a floor attenuates sounds. In some embodiments, sound abatement for underlayment is characterized in that it provides an impact insulation class rating of greater than about 50.

In some embodiments, the present disclosure includes methods of using compositions, and/or articles as described herein.

In some embodiments, provided methods include: positioning a first cellulosic layer as described in the present disclosure on a subfloor; positioning a second cellulosic layer as described in the present disclosure on a subfloor adjacent to a first cellulosic layer; and applying seam tape along the exposed edges of two adjacent cellulosic layers to connect adjacent layers so that the layers are substantially planar.

In some embodiments, methods include positioning a sound abatement layer between a subfloor and a cellulosic layer.

In some embodiments, methods include coating a cellulosic layer with an adhesive layer, a waterproof layer, or combination thereof.

In some embodiments, methods include removing a release liner applied to a designed floor covering side adhesive of a layer of double sided tape is applied to a top side of a cellulosic layer.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 shows a cross section of an underlayment system according to one embodiment of the present disclosure.

FIG. 2 shows a cross section of two adjacent cellulosic layers with a layer of double sided tape applied to a top side of a cellulosic layer. A layer of double sided tape shows a pullback exposing the cellulosic layer at an edge of a cellulosic layer. Seam tape is applied along an edge of two adjacent cellulosic layers connecting adjacent layers, as shown cellulosic layers and double sided tape are substantially planar.

FIG. 3 shows a cross section of two adjacent cellulosic layers with a layer of double sided tape applied to a top side of a cellulosic layer. A layer of double sided tape shows a pullback exposing the cellulosic layer at an edge of a cellulosic layer. Edges of two adjacent cellulosic layers are shown as connected. A space for seam tape is shown. Dimensions show a width of an edge of a cellulosic layer, X. Dimensions show a width of seam tape, Y. As shown layers, as shown cellulosic layers and double sided tape are substantially planar.

FIG. 4 shows a cross section of an underlayment system with a sound abatement layer according to one embodiment of the present disclosure.
FIG. 5 shows a cross section of two adjacent cellulose layers each atop a layer of sound abatement with a layer of double sided tape applied on to a top side of a cellulose layer. A layer of double sided tape shows a pullback exposing the cellulose layer at an edge of a cellulose layer. Seam tape is applied along an edge of two adjacent cellulose layers connecting adjacent layers, as shown cellulose layers and double sided tape are substantially planar.

FIG. 6 shows an image of a Luxury Vinyl Plank (LVP) residential installation that is not in accordance with the present disclosure. The construction shown in FIG. 6 was prepared for purposes of comparison.

DETAILED DESCRIPTION OF CERTAIN EMBODIMENTS

Various embodiments according to the present disclosure are described in detail herein. In particular, the present disclosure describes articles compositions and methods of manufacturing thereof. Provided articles are particularly useful, for example, as underlayments for a floor covering.

The present disclosure encompasses a recognition that floor coverings are typically not directly applied to a subfloor. The present disclosure also encompasses a recognition that application of an underlayment system to a subfloor provides a barrier between a subfloor and designed floor covering. An underlayment system provides a barrier for moisture and layer of cushioning.

Traditionally, designed floor coverings, such as resilient floor tiles are installed onto a subfloor. A subfloor is known to those skilled in the art and is made of plywood, concrete, etc. Installation of a designed floor covering, such as resilient floor tiles typically has included applying adhesive to the subfloor. The adhesive is often an acrylic latex. The adhesive must “set up” or dry for a time before the resilient floor tiles can be installed. Drying time depends on the weather conditions, such as temperature and humidity. It can take several minutes to several hours for set up. In extremely cold climates, on concrete subfloors, set up can take days. The additional time is an expense and an inconvenience to both the owner and the installer.

Another older but popular installation method is to use tiles where the adhesive is pre-applied to the back of the tile with a release liner. The release liner is then simply peeled off and the tile is installed on the subfloor.

The disadvantages of installing tiles directly to the subfloor with adhesive include:

1. The surface topography of the subfloor translates through to the designed floor covering. For example, rough concrete or gaps between plywood sheets if not properly prepared can telegraph through the tiles.

2. The preparation required of a subfloor to receive the tiles can require a lot of work such as skimming a rough subfloor with patch compound which must dry and then be sanded before flooring installation can begin.

3. Moisture and/or moisture vapor can emanate from on or below grade concrete subfloors. The moisture can re-emulsify (deactivate) the adhesive causing tiles to become unattached from the subfloor and also do damage to the tiles themselves.

4. In multi-story dwellings, when floor tiles directly adhered to the subfloor, sound abatement between stories is negligible.

5. When an owner wants to remove and/or replace an entire floor or a single tile, it requires considerable effort and time and may cause permanent damage to the subfloor.

Many innovations have been made over the years to minimize and/or eliminate many of the issues associated with tiles directly adhered to the subfloor. Some of these innovations include:

1. Tiles that connect to each other but are not directly adhered to the subfloor. Some examples of these floating floor products are mechanically joined products (e.g., tongue and groove and click-joint systems) and adhesively joined products (e.g., tape and ship-lap joined systems).

2. Tile systems with high friction backings (such as suction cups) that prevent the tile from moving in the plane of the subfloor, but are relatively easy to remove from the plane of the floor.

While these systems allow for easier removal, they do not address any of the issues associated with subfloor preparation, telegraphing, moisture, and/or sound abatement.

3. Underlayment systems

Typical underlayment is a flexible material that is installed over top of the subfloor and then designed floor covering, such as resilient floor tiles are installed over top of the underlayment.

Underlaments usually comes in to six foot wide rolls. For a typical installation, such as resilient floor tile, the underlayment material is loose-laid into a room. The underlayment is not adhered to the subfloor. If the room in any dimension is larger than the underlayment roll width, then multiple sheets of underlayment need to be loose laid side to side. To keep these sheets from moving relative to each other during the tile installation, seam tape is applied on the tile or floor side of the seam between each underlayment sheet to hold them together. Seam tape is a few mils thick. Adhesive is then spread over the underlayment and the tiles are installed on the underlayment. The thickness of the adhesive will generally even out any bump caused by the seam tape due to its thickness. As with adhesive spread directly on a subfloor, the adhesive drying time will greatly depend on the weather conditions.

The underlayment depending on the product can reduce or eliminate the subfloor preparation time because it can mask or minimize subfloor imperfections, provide a moisture barrier, provide sound abatement, and make the tiles easy to remove if the underlayment is not adhered to the subfloor.

Another class of underlayment exists that typically includes the following layers from floor to tile side: a layer of plastic film or foam, followed by a plastic or cellulose substrate, then a pre-applied adhesive and a release liner. With this type of construction, the plastic or cellulose substrate is often heat sensitive and/or solvent sensitive. If the adhesive is not carefully selected and applied the plastic or cellulose substrate will suffer swelling and/or shrinkage due to solvents and/or heat. And therefore, an adhesive system must be carefully selected and used so as not to damage the plastic or cellulose substrate during application thereof. Another possible issue could arise with an adhesive that is pre-applied to a substrate. If the substrate’s cohesive strength is less than that of the adhesive bond strength to the tile, the tile cannot be repositioned during installation without tearing the substrate thereby damaging the underlayment.

In some cases, the interconnecting tiles and the underlayment systems are combined. For example, mechani-
ally joined resilient planks with foamed underlayments. However, the additional cost of the mechanically joined products combined with the underlayment cost can make this combination quite expensive.

When PVC films/foams are used alone or in combination with PVC resilient tiles, the adhesive also must be plasticizer resistant. Plasticizers can migrate into the adhesive softening it causing the tiles to come loose from the underlayment. Typically, more expensive high performance acrylic adhesives must be used as cheaper rubber-based adhesives are sensitive to plasticizers.

Seaming sheets of underlayment with pre-applied adhesive requires that a seam tape be applied either on the floor or tile side of the underlayment. The addition of the seam tape which can be a few mils thick can create a “bump” between each seam. When the flooring tiles are laid on top of the underlayment, this “bump” can sometimes telegraph through the floor tiles as some resilient tiles (mainly thinner ones say <3.5 mm) will conform to the texture of what is beneath them.

The present disclosure provides articles. In some embodiments, articles are compositions of materials that are or can be effectively utilized as underlayments. In some embodiments, underlayments of the present disclosure require little to no subfloor preparation. In some embodiments, underlayments of the present disclosure require no adhesive drying time. In some embodiments, underlayments of the present disclosure allow tile repositionability when light pressure is used to position tile. In some embodiments, underlayments of the present disclosure employ a multi-adhesive system to reduce adhesive costs and installer costs for both installation time and when the time comes to remove the installation in favor of new flooring. In some embodiments, underlayments of the present disclosure minimize subfloor topography telegraphing. In some embodiments, underlayments of the present disclosure is easy to seam without seam tape telegraphing at the seam joints. In some embodiments, underlayments of the present disclosure provide a moisture barrier. In some embodiments, underlayments of the present disclosure provide a sound abatement.

**Underlayment**

In some embodiments, the present disclosure provides underlayments and underlayment systems. In some embodiments, a combination of flooring, such as standard resilient tiles (with no joining mechanisms) and underlayment have the best balance of value, efficiency, and cost.

In some embodiments, underlayments comes in a roll. In some embodiments, when underlayments comes in roll form, it is easy for an installer to transport and apply to a subfloor.

In some embodiments, underlayment is a flexible material. In some embodiments, underlayments are made from a variety of materials but in general consist of a plastic film or a plastic layer on a carrier sheet (e.g., Congoleum’s Underflor® product). In some embodiments, underlayments are a foam material such as a polyethylene, rubber, PVC, or urethane foam. In some embodiments, underlayments include a carrier sheet made from a plastic film or a cellulosic paper-like material. In some embodiments, underlayments are a “natural foam” such as cork.

In some embodiments, underlayment is a cellulosic material. In some embodiments, a cellulosic material include cellulose or cellulose like material, such as paper.

In some embodiments, a cellulosic material is felt.

In some embodiments, a cellulosic layer is about 5 mils thick, about 6 mils thick, about 7 mils thick, about 8 mils thick, about 9 mils thick, about 10 mils thick, about 11 mils thick, about 12 mils thick, about 13 mils thick, about 14 mils thick, about 15 mils thick, about 16 mils thick, about 17 mils thick, about 18 mils thick, about 19 mils thick, about 20 mils thick, about 21 mils thick, about 22 mils thick, about 23 mils thick, about 24 mils thick, about 25 mils thick, about 26 mils thick, about 27 mils thick, about 28 mils thick, about 29 mils thick, about 30 mils thick, about 31 mils thick, about 32 mils thick, about 33 mils thick, about 34 mils thick, about 35 mils thick, about 36 mils thick, about 37 mils thick, about 38 mils thick, about 39 mils thick, about 40 mils thick, about 41 mils thick, about 42 mils thick, about 43 mils thick, about 44 mils thick, about 45 mils thick, about 46 mils thick, about 47 mils thick, about 48 mils thick, about 49 mils thick, about 50 mils thick, or more.

In some embodiments, underlayment of the present disclosure includes a cellulosic layer.

In some embodiments, a cellulosic layer has a top side and a bottom side. In some embodiments, a bottom side of a cellulosic layer contacts a subfloor.

In some embodiments, a cellulosic layer is laid atop a subfloor without securing. In some embodiments, a cellulosic layer is rolled onto a subfloor. In some embodiments, a cellulosic layer is dropped, rested, and/or laid across a subfloor. In some embodiments, a cellulosic layer floats atop a subfloor.

In some embodiments, a cellulosic layer is secured to a subfloor. In some embodiments, a cellulosic layer is secured for example with staples, nails, screws, tacks, and/or other mechanical means known to those in the art. In some embodiments, a cellulosic layer is secured for example with adhesive. In some embodiments, an adhesive is applied to a bottom side of a cellulosic layer. In some embodiments, when a cellulosic layer is secured with adhesive, it is uniformly applied on underlayment. In some embodiments, when a cellulosic layer is secured with adhesive, it is applied on underlayment according to a pattern.

In some embodiments, an article of underlayment is a composition that includes a layer of double sided tape applied to a cellulosic layer.

In some embodiments, a layer of double sided tape is about 1 mil thick, about 2 mils thick, about 3 mils thick, about 4 mils thick, about 5 mils thick, about 6 mils thick, about 7 mils thick, about 8 mils thick, about 9 mils thick, about 10 mils thick, about 11 mils thick, about 12 mils thick, about 13 mils thick, about 14 mils thick, about 15 mils thick, about 16 mils thick, about 17 mils thick, about 18 mils thick, about 19 mils thick, about 20 mils thick, or more.

In some embodiments, double sided tape has multiple layers. In some embodiments, double sided tape has a subfloor side adhesive, an interliner, and a designed floor covering side adhesive.

In some embodiments, an interliner is cloth. In some embodiments, an interliner is PVC. In some embodiments, an interliner is polyethylene foam. In some embodiments, an interliner is urethane. In some embodiments, an interliner is paper. In some embodiments, an interliner is polyester. In some embodiments, an interliner is rubber. In some embodiments, an interliner is vinyl.

In some embodiments, an adhesive is acrylic. In some embodiments, an adhesive is vinyl. In some embodi-
ments, an adhesive is rubber. In some embodiments, an adhesive is epoxy. It is appreciated that one skilled in the art is familiar with a variety of adhesive alternatives.

[0092] In some embodiments, a subfloor side adhesive of double sided tape is applied to a top side of a cellulose layer.

[0093] In some embodiments, an area of a subfloor side adhesive of a layer of double sided tape is smaller than a cellulose layer so that when such a layer of double sided tape is applied atop a cellulose layer there is a pullback. In some embodiments, a pullback exists when a layer of double sided tape is applied to a top side of a cellulose layer and the layer of double sided tape does not extend to an edge of a cellulose layer. In some embodiments, such a pullback exposes an area of cellulose layer at an edge of the cellulose layer.

[0094] In some embodiments, a length of an exposed area of a pullback is along an entire edge of a cellulose layer.

[0095] In some embodiments, a width of a pullback is about 0.25 inches, about 0.275 inches, about 0.3 inches, 0.325 inches, about 0.35 inches, about 0.375 inches, about 0.4 inches, 0.425 inches, about 0.45 inches, about 0.475 inches, about 0.5 inches, 0.525 inches, about 0.55 inches, about 0.575 inches, about 0.6 inches, 0.625 inches, about 0.65 inches, about 0.675 inches, about 0.7 inches, 0.725 inches, about 0.75 inches, about 0.775 inches, about 0.8 inches, 0.825 inches, about 0.85 inches, about 0.875 inches, about 0.9 inches, 0.925 inches, about 0.95 inches, about 0.975 inches, about 1 inch, about 1.125 inches, about 1.15 inches, about 1.175 inches, about 1.2 inches, about 1.225 inches, about 1.25 inches, about 1.275 inches, about 1.3 inches, 1.325 inches, about 1.35 inches, about 1.375 inches, about 1.4 inches, 1.425 inches, about 1.45 inches, about 1.475 inches, about 1.5 inches, 1.525 inches, about 1.55 inches, about 1.575 inches, about 1.6 inches, 1.625 inches, about 1.65 inches, about 1.675 inches, about 1.7 inches, 1.725 inches, about 1.75 inches, about 1.775 inches, about 1.8 inches, 1.825 inches, about 1.85 inches, about 1.875 inches, about 1.9 inches, 1.925 inches, about 1.95 inches, about 1.975 inches, about 2 inches, about 2.125 inches, about 2.15 inches, about 2.175 inches, about 2.2 inches, about 2.225 inches, about 2.25 inches, about 2.275 inches, about 2.3 inches, 2.325 inches, about 2.35 inches, about 2.375 inches, about 2.4 inches, 2.425 inches, about 2.45 inches, about 2.5 inches, 2.525 inches, about 2.55 inches, about 2.575 inches, about 2.6 inches, 2.625 inches, about 2.65 inches, about 2.675 inches, about 2.7 inches, 2.725 inches, about 2.75 inches, about 2.75 inches, about 2.8 inches, 2.825 inches, about 2.85 inches, about 2.875 inches, about 2.9 inches, 2.925 inches, about 2.95 inches, about 2.975 inches, about 3 inches, about 3.125 inches, about 3.15 inches, about 3.175 inches, about 3.2 inches, about 3.225 inches, about 3.25 inches, about 3.275 inches, about 3.3 inches, about 3.325 inches, about 3.35 inches, about 3.375 inches, about 3.4 inches, 3.425 inches, about 3.45 inches, about 3.47 inches, about 3.5 inches, 3.525 inches, about 3.55 inches, about 3.575 inches, about 3.6 inches, 3.625 inches, about 3.65 inches, about 3.675 inches, about 3.7 inches, 3.725 inches, about 3.75 inches, about 3.775 inches, about 3.8 inches, 3.825 inches, about 3.85 inches, about 3.875 inches, about 3.9 inches, 3.925 inches, about 3.95 inches, about 3.975 inches, about 4 inches, or more.

[0096] In some embodiments, any area of a top side of a cellulose layer that does not have a pullback has a subfloor side adhesive of a layer of double sided tape applied thereto.

[0097] In some embodiments, a width of a pullback, that is a distance from an edge of an exposed area of a cellulose layer to a start of an applied area of double sided tape, is greater than one half of a width of a layer of seam tape. In some embodiments, a width of a pullback is about 0.125 inches. In some embodiments, a width of a pullback is about 1.25 inches. In some embodiments, a width of a layer of seam tape is about 1.89 inches.

[0098] In some embodiments, when underlayer including a cellulose layer having double sided tape applied is positioned atop a subfloor and the area of subflooring to be covered is larger than a width of the underlayer roll, additional underlayer is positioned and applied to the area of subflooring to be covered. When additional underlayer including a cellulose layer having double sided tape applied thereto is positioned and applied, it is positioned and applied adjacent so that there is uniform underlayer coverage to a subfloor. In some embodiments, multiple sections of underlayer are needed to substantially uniformly cover a subfloor.

[0099] In some embodiments, a length of an entire edge of each cellulose layer of adjacent sections of underlayer are aligned such that an exposed edge of each pullback of each section underlayer touches.

[0100] In some embodiments, two adjacent areas of underlayer are joined across aligned areas of pullback between two adjacent sections of underlayer.

[0101] In some embodiments, tape is positioned across two adjacent areas of underlayer.

[0102] In some embodiments, tape joins two adjacent sections of underlayer.

[0103] In some embodiments, tape is a seam tape.

[0104] In some embodiments, a width of seam tape is any standard width known in the art. In some embodiments, a width of seam tape is about 0.5 inches, 0.525 inches, about 0.55 inches, about 0.575 inches, about 0.6 inches, 0.625 inches, about 0.65 inches, about 0.675 inches, about 0.7 inches, 0.725 inches, about 0.75 inches, about 0.775 inches, about 0.8 inches, 0.825 inches, about 0.85 inches, about 0.875 inches, about 0.9 inches, 0.925 inches, about 0.95 inches, about 0.975 inches, about 1 inch, about 1.125 inches, about 1.15 inches, about 1.175 inches, about 1.2 inches, about 1.225 inches, about 1.25 inches, about 1.275 inches, about 1.3 inches, 1.325 inches, about 1.35 inches, about 1.375 inches, about 1.4 inches, 1.425 inches, about 1.45 inches, about 1.475 inches, about 1.5 inches, 1.525 inches, about 1.55 inches, about 1.575 inches, about 1.6 inches, 1.625 inches, about 1.65 inches, about 1.675 inches, about 1.7 inches, 1.725 inches, about 1.75 inches, about 1.775 inches, about 1.8 inches, 1.825 inches, about 1.85 inches, about 1.875 inches, about 1.9 inches, 1.925 inches, about 1.95 inches, about 1.975 inches, about 2 inches, about 2.125 inches, about 2.15 inches, about 2.175 inches, about 2.2 inches, about 2.225 inches, about 2.25 inches, about 2.275 inches, about 2.3 inches, 2.325 inches, about 2.35 inches, about 2.375 inches, about 2.4 inches, 2.425 inches, about 2.45 inches, about 2.5 inches, 2.525 inches, about 2.55 inches, about 2.575 inches, about 2.6 inches, 2.625 inches, about 2.65 inches, about 2.675 inches, about 2.7 inches, 2.725 inches, about 2.75 inches, about 2.75 inches, about 2.8 inches, 2.825 inches, about 2.85 inches, about 2.875 inches, about 2.9 inches, 2.925 inches, about 2.95 inches, about 2.975 inches, about 3 inches, about 3.125 inches, about 3.15 inches, about 3.175 inches, about 3.2 inches, about 3.225 inches, about 3.25 inches, about 3.275 inches, about 3.3 inches, 3.325 inches, about 3.35 inches, about 3.375 inches, about 3.4 inches, 3.425 inches, about 3.45 inches, about 3.47 inches, about 3.5 inches, 3.525 inches, about 3.55 inches, about 3.575 inches, about 3.6 inches, 3.625 inches, about 3.65 inches, about 3.675 inches, about 3.7 inches, 3.725 inches, about 3.75 inches, about 3.775 inches, about 3.8 inches, 3.825 inches, about 3.85 inches, about 3.875 inches, about 3.9 inches, 3.925 inches, about 3.95 inches, about 3.975 inches, about 4 inches, or more.
inches, about 3.475 inches, about 3.5 inches, 3.525 inches, about 3.55 inches, about 3.575 inches, about 3.6 inches, 3.625 inches, about 3.65 inches, about 3.675 inches, about 3.7 inches, 3.725 inches, about 3.75 inches, 3.775 inches, about 3.8 inches, 3.825 inches, about 3.85 inches, 3.875 inches, about 3.9 inches, 3.925 inches, about 3.95 inches, about 3.975 inches, about 4 inches, about 4.125 inches, about 4.15 inches, about 4.175 inches, about 4.2 inches, about 4.225 inches, about 4.25 inches, about 4.275 inches, about 4.3 inches, 4.325 inches, about 4.35 inches, 4.375 inches, about 4.4 inches, 4.425 inches, about 4.45 inches, 4.475 inches, about 4.5 inches, 4.525 inches, about 4.55 inches, about 4.575 inches, about 4.6 inches, 4.625 inches, about 4.65 inches, about 4.675 inches, about 4.7 inches, 4.725 inches, about 4.75 inches, about 4.775 inches, about 4.8 inches, 4.825 inches, about 4.85 inches, about 4.875 inches, about 4.9 inches, 4.925 inches, about 4.95 inches, about 4.975 inches, about 5 inches, about 5.25 inches, about 5.5 inches, about 5.75 inches, about 6 inches, 6.25 inches, about 6.5 inches, about 6.75 inches, about 7 inches, about 7.25 inches, about 7.5 inches, about 7.75 inches, about 8 inches, or more.

In some embodiments, a layer of seam tape is substantially a same thickness as double sided tape. In some embodiments, a layer of seam tape is double sided tape.

In some embodiments, a layer of seam tape is about 1 mil thick, about 2 mils thick, about 3 mils thick, about 4 mils thick, about 5 mils thick, about 6 mils thick, about 7 mils thick, about 8 mils thick, about 9 mils thick, about 10 mils thick, about 11 mils thick, about 12 mils thick, about 13 mils thick, about 14 mils thick, about 15 mils thick, about 16 mils thick, about 17 mils thick, about 18 mils thick, about 19 mils thick, about 20 mils thick, or more.

In some embodiments, when a section of underlayment that includes a cellulosic layer having double sided tape applied is positioned atop a subfloor and is adjacent to another section of underlayment that includes a cellulosic layer having double sided tape positioned atop a subfloor, a length of a pullback along an entire edge of each cellulosic layer for both areas of underlayment that are adjacent and aligned are joined using a layer of seam tape.

In some embodiments, when a layer of seam tape joins adjacent layers of underlayment, a smooth surface that minimizes and/or eliminates any telegraphing of seam joints is formed, so that top surface of the surface for seam tape used to join sections of underlayment is flat and/or substantially planar with joined sections of underlayment. That is, when seam tape is applied along a pullback of an edge of two adjacent cellulosic layers, seam tape connects the layers, so that the layers are substantially planar.

In some embodiments, an article of underlayment is a composition that includes a cellulosic layer that is coated on at least one side.

In some embodiments, a coating on a cellulosic layer is characterized in that it provides adhesion. In some embodiments, a coating on a cellulosic layer is characterized in that it imparts waterproofing.

In some embodiments, a coating is an acrylic, epoxy, rubber, silicone etc.

In some embodiments, an article of underlayment is a composition that includes a layer of material for sound abatement. In some embodiments, a sound abatement layer is positioned between a subfloor and a cellulosic layer. In some embodiments, a sound abatement layer is foam, concrete, masonry, wood, plastics, insulating wool, or composites. In some embodiments, sound abatement for underlayment is characterized by an impact insulation class (or IIC) rating. In some embodiments, an IIC provides a rating of how well a floor attenuates sounds. In some embodiments, sound abatement for underlayment is characterized in that it provides an impact insulation class rating of greater than about 50.

Methods of Forming Underlayment

In some embodiments, the present disclosure includes methods of using compositions, and/or articles as described herein.

In some embodiments, provided methods include positioning a first cellulosic layer as described in the present disclosure on a subfloor; positioning a second cellulosic layer as described in the present disclosure on a subfloor adjacent to a first cellulosic layer; and applying seam tape along the exposed edges of two adjacent cellulosic layers to connect adjacent layers so that the layers are substantially planar.

In some embodiments, methods include positioning a sound abatement layer between a subfloor and a cellulosic layer.

In some embodiments, methods include coating a cellulosic layer with an adhesive layer, a waterproof layer, or combination thereof.

In some embodiments, methods include removing a release coating applied to a design floor covering side adhesive of a layer of double sided tape is applied to a top side of a cellulosic layer.

EXEMPLIFICATION

Example 1

In some embodiments of the present disclosure an underlayment system is an article. As shown in FIG. 1, a composition from floor side to tile side forms an article of underlayment 170.

1. Felt substrate 110. A felt substrate 110 is a flexible cellulosic substrate consisting of wood pulp, latex binder and limestone. A felt substrate 110 can have coatings on one or both sides to improve adhesion to subsequent layers and/or to impart water proofing. A preferred felt substrate 110 is 23 mil J felt manufactured by Congoleum.

2. Double-sided tape 120. Double sided tape 120 comprises layers, including a floor adhesive layer 160, an interliner 150, a tile adhesive layer 140, and a release liner 130 that has a release coating on both sides. A preferred interliner 150 is a polyester film such as PET. A preferred floor adhesive layer 160 and tile adhesive layer 140 is an acrylic. To reduce cost, another preferred floor adhesive layer 160 is a cheaper rubber-based adhesive. A rubber-based adhesive can be used here as plasticizer from resilient tiles cannot
reach a floor adhesive layer 160 due to the inter-liner 150 acting as a barrier. Additionally rubber-based adhesive can be utilized as both the floor adhesive layer 160 and tile adhesive layer 140 if the resilient tile has no plasticizers (e.g., rigid PVC or non-PVC constructions).

[0124] This construction provides the following features:

[0125] Little to no subfloor preparation and minimizes subfloor topography as the felt 110 will go over non-clean surfaces, bridge subfloor gaps, and spread out subfloor bumps.

[0126] A moisture barrier since the inter-liner 150 functions as a moisture barrier to protect the tiles from moisture.

[0127] Requires no adhesive drying time as the double-sided tape adhesive needs no drying time before the tiles can be set.

[0128] Some level of tile repositionability as the inter-liner 150 generally has greater cohesive strength than the felt 110.

[0129] A multi-adhesive system to reduce cost as a combination of a cheaper rubber adhesive can be used on the floor side while a more expensive acrylic can be used on the tile side. The combination of both rubber and acrylic adhesive can result in a cheaper overall adhesive cost relative to a double acrylic tape or a single pre-applied acrylic adhesive.

[0130] As shown in FIG. 2, two articles of underlayment 270 are joined by seam tape 230. The orientation of the double-sided 220 tape to the felt substrate 210. The double-sided tape 220 is laminated to the felt substrate 210 such that the edge of the double-sided tape 225 is not flush with the edge of the felt substrate 215, but set back from the felt edge 215 a given distance, a pullback, x. The purpose of this positioning is that when the article underlayment 270 is butted together edge to edge, a double-sided seam tape 230 of the same gauge as the double sided tape 220 (in fact it can be the same tape) can be applied to the felt substrate 210 on both sides of the article of underlayment 270 to make a seam that is the same height as the article of underlayment 270. In some embodiments, such a construction results with no bump visible or telegraphing through the flooring (not shown).

[0131] As shown in FIG. 3, shows two adjacent articles of underlayment 370, each including a felt substrate 310 and double-sided tape, 320. A width between two adjacent articles of underlayment 370 is a distance, y, between edges 325 of double-sided tape on adjacent articles of underlayment 370. Distance y should be greater than the width of the seam tape (not shown). The seam tape (not shown) is about twice the pullback, x, a distance between each felt edge 315 to an edge of double-sided tape 325. The distance y (or in mathematical terms represented by 2x-y). This relationship allows for some deviation in the flatness of applying the seam tape to a long seam. Preferred x and y values are 1.125" and 1.89", respectively.

**Example 2**

[0132] As shown in FIG. 4, in some embodiments of the present disclosure, all of the features of Example 1 with the addition of sound abatement is described below from floor side to tile side. As shown in FIG. 4, an article of underlayment 470 in accordance with some embodiments, includes a felt substrate 410, double-sided tape 420, and a foam layer 480.

[0133] 1. Foam 480: A foam layer 480 can be any type of foam where a polymer foam is preferred. The most preferred foam is a PVC foam manufactured by Congoleum (G04) at approximately 44 mils thick.

[0134] 2. Felt Substrate: A felt substrate 410 is any material that is needed to process the foam layer 480 (i.e., a substrate to coat the foam on). A preferred substrate is 23 mil J felt manufactured by Congoleum.

[0135] 3. Double-sided tape 420: Double-sided tape 420 consists of an adhesive layer 460, an inter-liner 450, a tile adhesive layer 440, and a release liner 430 that has a release coating on both sides. A preferred inter-liner 450 is a polyester film such as PET. Preferred floor adhesive layer 460 and tile adhesive layer 440 are acrylics. A rubber-based adhesive is less preferred on a floor side when a PVC foam is used.

[0136] As shown in FIG. 5, two articles of underlayment 570 are joined by seam tape 530. The orientation of the double-sided 520 tape to the felt substrate 510. A felt substrate 510 is on top of a foam layer 540. The double-sided tape 520 is laminated to the felt substrate 510 such that the edge of the double-sided tape 525 is not flush with the edge of the felt substrate 515, but set back from the felt edge 515. The relationship between the distance the tape is from the felt edge and the seam tape width is as defined in Example 1. In some embodiments, such a construction results with no bump visible or telegraphing through the flooring (not shown).

[0137] The construction above gives Impact Insulation Class (IIC) ratings on concrete over a suspended ceiling (ASTM E492-09) of 58-59 when commercially available LVT (Luxury Vinyl Tile) and LVP (Luxury Vinyl Plank) such as Congoleum’s DuraCeramic, Endurance, and Structure products were installed on this underlayment. An IIC rating of at least 50 is recommended for multi-story dwellings.

**Example 3**

[0138] In stark contrast, to provided articles, compositions, and methods, a construction was prepared where the seam tape is oriented flush with the felt edges on the felt substrate. FIG. 6 shows a two mm thick Luxury Vinyl Plank (LVP) in a residential installation. The composition of Example 2 was used as an underlayment for the LVP. In the present example, the double-sided tape however was not oriented with a set back from the felt edge a given distance as is shown in FIG. 5. Instead, the double sided tape on the felt substrate was applied such that it was flush to the edge of the felt (no pullback or exposed felt on the edges). Multiple widths of the underlayment composition of Example 2 were held together with seam tape such that the seam tape thickness extended above the underlayment a few mils. Two mm LVP was then installed on top of the underlayment. As shown in FIG. 6, after approximately one year, arrows show the seam tape telegraphing through the LVP.

**OTHER EMBODIMENTS AND EQUIVALENTS**

[0139] While the present disclosures have been described in conjunction with various embodiments, and examples, it is not intended that they be limited to such embodiments, or examples. On the contrary, the disclosures encompass various alternatives, modifications, and equivalents, as will be appreciated by those of skill in the art. Accordingly, the descriptions, methods and diagrams of should not be read as limited to the described order of elements unless stated to that effect.
[0140] Although this disclosure has described and illustrated certain embodiments, it is to be understood that the disclosure is not restricted to those particular embodiments. Rather, the disclosure includes all embodiments, that are functional and/or equivalents of the specific embodiments, and features that have been described and illustrated. Moreover, the features of the particular examples and embodiments, may be used in any combination. The present disclosure therefore includes variations from the various examples and embodiments, described herein, as will be apparent to one of skill in the art.

What is claimed is:

1. An underlayment system for flooring, comprising:
   a cellulosic layer for positioning atop a subfloor; and
   a layer of double sided tape comprising a subfloor side adhesive, an interliner, and a design floor covering side adhesive,
   wherein the subfloor side adhesive of the double sided tape layer is applied to a top side of the cellulosic layer, and
   wherein the layer of double sided tape is applied such that there is a pullback exposing the cellulosic layer at an edge of the cellulosic layer, so that when seam tape is applied along the edge of two adjacent cellulosic layers connecting the layers, the layers are substantially planar.

2. The underlayment system for flooring of claim 1, wherein the cellulosic layer is felt.

3. The underlayment system for flooring of claim 1, wherein the pullback is greater than one half of a width of seam tape.

4. The underlayment system for flooring of claim 1, wherein a layer of sound abatement material is positioned between the subfloor and the cellulosic layer.

5. The underlayment system for flooring of claim 1, wherein the sound abatement layer is foam.

6. The underlayment system for flooring of claim 1, wherein the underlayment system is characterized in that there is no adhesive drying time.

7. The underlayment system for flooring of claim 1, wherein the underlayment system comprises a release liner with a release coating removably applied to the design floor covering side adhesive layer.

8. The underlayment system for flooring of claim 1, wherein the cellulosic layer is coated on at least one side.

9. The underlayment system for flooring of claim 8, wherein the coating on the cellulosic layer is characterized in that it provides adhesion.

10. The underlayment system for flooring of claim 8, wherein the coating on the cellulosic layer is characterized in that it imparts waterproofing.

11. The underlayment system for flooring of claim 1, wherein the cellulosic layer is about 23 mil.

12. The underlayment system for flooring of claim 7, wherein the system is characterized in that it is capable of being rolled so that it is easy to store and apply.

13. The underlayment system for flooring of claim 1, wherein the system is characterized in that it provides an impact insulation class rating of about 58.

14. A method of using an underlayment system for flooring, wherein the underlayment system for flooring, comprises a cellulosic layer for positioning atop a subfloor; and a layer of double sided tape comprising a subfloor side adhesive, an interliner, and a design floor covering side adhesive, wherein the subfloor side adhesive of the double sided tape layer is applied to a top side of the cellulosic layer, and wherein the layer of double sided tape is applied such that there is a pullback exposing the cellulosic layer at an edge of the cellulosic layer, the method comprising steps of:
   positioning a first cellulosic layer on the subfloor;
   positioning a second cellulosic layer on the subfloor adjacent to the first layer; and
   applying seam tape along the exposed edges of two adjacent cellulosic layers to connect adjacent layers so that the layers are substantially planar.

15. The method of claim 15, wherein the cellulosic layer is felt.

16. The method of claim 15, further comprising positioning a layer of sound abatement material is positioned between the subfloor and the cellulosic layer.

17. The method of claim 15, wherein the cellulosic layer is cork.

18. The method of claim 15, wherein the positioning step comprises first coating the cellulosic layer with an adhesive layer, a waterproof layer, or combination thereof.

19. The method of claim 15, wherein the underlayment system comprises a release liner with a release coating removably applied to the design floor covering side adhesive layer.

20. The method of claim 19, wherein the positioning step comprises removing the release liner.

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